

Citation: Hou, X. Y., Y. Han, X. Q. Hu, et al., 2019: Verification of Fengyun-3D MWTS and MWHS calibration accuracy using GPS radio occultation data. *J. Meteor. Res.*, **33**(4), 695–704, doi: 10.1007/s13351-019-8208-9.

英文题目: Verification of FengYun-3D MWTS and MWHS Calibration Accuracy Using GPS Radio Occultation Data

作者: HOU Xueyan, HAN Yang, HU Xiuqing and WENG Fuzhong *.

英文摘要: The newly launched FengYun-3D (FY-3D) satellite carries microwave temperature sounder (MWTS) and microwave humidity sounder (MWHS), providing the global atmospheric temperature and humidity measurements. It is important to assess the in orbit performance of MWTS and MWHS and understand their calibration accuracy before using them in numerical weather prediction and many other applications such as hurricane monitoring. This study aims at quantifying the biases of MWTS and MWHS observations to the simulations from the collocated Global Positioning System (GPS) radio occultation (RO) data. Using the collocated FY-3C Global Navigation Satellite System Occultation Sounder (GNOS) RO data under clear-sky conditions as inputs to Community Radiative Transfer Model (CRTM), brightness temperatures and viewing angles are simulated for the upper level sounding channels of MWTS and MWHS. In order to obtain O–B statistics under clear sky conditions, a cloud detection algorithm is developed using the two MWTS channels with frequencies at 50.3 and 51.76 GHz and the two MWHS channels with frequencies centered at 89 and 150 GHz. The analysis shows that for the upper air sounding channels, the mean biases of the MWTS observations relative to the GPS RO simulations are negative for channels 5–9, with absolute values <1 K, and positive for channels 4 and 10, with values <0.5 K. For the MWHS observations, the mean biases in brightness temperature are negative for channels 2–6, with absolute values <2.6 K and relatively small standard deviations. The mean biases are also negative for channels 11–13, with absolute values <1.3 K, but with relatively large standard deviations. The biases of both MWTS and MWHS show scan-angle dependence and are asymmetrical across the scan line. The biases for the upper air MWTS and MWHS sounding channels are larger than those previously derived for the Advanced Technology Microwave Sounder.

中文题目: 基于 GPS 掩星资料的 FY-3D 微波温度计和湿度计定标精度评估

我国新发射的 FY-3D 卫星搭载的微波温度计 (MWTS) 和微波湿度计 (MWHS) 可探测全球大气垂直温度和湿度信息, 将这些资料同化应用到数值预报模式以及其他应用 (如台风监测) 之前, 需要对卫星的在轨性能和定标精度进行全面评估和验证。本文采用高精度的 FY-3C GNOS 掩星探测资料, 基于快速辐射传输模式 CRTM, 将晴空条件下匹配的 FY-3C GNOS 掩星资料作为 CRTM 的输入, 模拟 MWTS 和 MWHS 的高层通道亮温, 对 FY-3D 微波温度计和微波湿度计进行定标精度评估。为得到晴空条件下的统计结果, 本文还基于微波温度计和微波湿度计的窗区通道开发了新的云检测算法。结果表明 MWTS 和 MWHS 高层通道均存在角度依赖性, 且与美国先进微波探测计 (ATMS) 相比, MWTS 和 MWHS 的高层探测通道偏差较大。

文章结构图:

